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ABSTRACT

The metacognitive strategies used in reading were studied for students from grade 2 through grade 12 (no data were collected for grade 4). The Strategic Teaching and Reading Project (STRP) is a research-based instructional improvement and staff development project to improve reading comprehension. Ten K-12 public schools, and 1,570 students participated in this study. All schools and teachers participated in a 2-year STRP plan. Teachers were exposed to and trained on five global reading strategies of STRP, including metacognition, for 3 consecutive days and were given training in using the approach in the classroom. The researchers created a framework of 35 metacognitive behaviors based on a literature review. Findings suggest that students used 19 of the 35 metacognitive behaviors. The fact that metacognitive strategies proved effective suggests that these strategies should be integrated into instruction for students at various ability levels, ages, and grade levels. (Contains 10 tables and 16 references.) (SLD)

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Students Reflecting On What They Know

by

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In today's world of student assessments, higher test scores, and school accountability for student achievement, thinking skills and reading strategies are areas in reading where much concern and emphasis is exercised. Reading strategies are of interest because of what they reveal about the way readers interact with written text and how these strategies are related to text comprehension (Carrell 1989). Today "metacognition" appears to be the new wave for researchers, psychologists and educators who seek full understanding of this not so new concept.

Muñiz-Swicegood (1994) cites and presents Hype and Bizar's (1989) early definition of metacognition. According to Hype and Bizar's, early understanding of metacognition was evident in the late 1800s. It was defined as a process where "the individual carefully considers thought in problem solving situations through the strategies of self-planning, self-monitoring, self-regulating, self-questioning, self-reflecting, or self-reviewing." While there is a vast number of definitions for metacognition, all concentrate on knowledge about cognition, awareness and control.

In the later years, recognition was bestowed to John Flavell (1979) for his pioneering efforts in the field of cognitive psychology as it relates to knowledge and metacognition. Flavell believed that metacognition was the active monitoring and consequent regulation and orchestration of mental processes. It was based on knowledge and experiences that were both metacognitive. Although Flavell's works were elaborate, many have sought to find more about this complex behavior of thinking about your own thinking. Most recently, other researchers have been associated with the term metacognition. Their definitions of metacognition coincide, all relating to the thinking processes and regulation of learning. The following definitions support this point.

- ✓ an internal dialogue (Weir, 1998);
- ✓ a self-regulatory process (Gourgey, 1998);
- ✓ a monitoring meaning system (Harste, 1989);
- ✓ the awareness of one's thinking (ERS, 1999);
- ✓ being aware of learning as a process and of what will facilitate learning (Sturomski, 1997).
- ✓ goal-setting, self-instruction, self-monitoring, and self-reinforcement (Graham, Harris, & Reid, 1992); and
- ✓ reflecting on what one's know and self-regulating learning (Chiroque and Rodriguez, 1999)

In 1984, Baker and Brown differentiated two types of metacognition: (1) knowledge about cognition, and (2) regulation of cognition. *Knowledge about cognition* implies the knowledge an individual dominates about his or her own cognitive resources, examples include taking notes, asking questions, or filling out a chart, and how compatible the person is with the learning situation. For example, if the middle school kid of the previous example continue to believe that using background music and rewriting help her learn better, she is likely to persist in utilizing these resources. Baker and Brown also clarify that knowledge about cognition is stationary over time; can be explained by the learner; may not be reliable; and is more cultivated in older learners. The second type of metacognition, *regulation of cognition*, embodies "self-regulatory mechanisms used by an active learner during an ongoing attempt to solve problems. These indexes of metacognition include checking the outcome of any attempt to solve the problem, planning

one's next move, monitoring the effectiveness of any attempted action, and testing, revising, and evaluating one's strategies for learning." (Baker and Brown, 1984, p. 354). The characteristics attached to the regulation of cognition are thought to be unstable over time; not frequently used by the learner; either young or older children and adults can regulate their own activities.

Bisanz, Vesonder, and Voss (1978) found significant developmental differences between young students (first through third grade) and older students (fifth through college students) in the ability to monitor current knowledge in memory and in how the results of monitoring are used in the allocation of study efforts. In the same direction, Feitler and Hellekson (1993) examined at risk primary grade students. Through paraphrasing and self-verbalization instruction, the students' metacognitive awareness of reading strategies was enhanced.

Mark Tregaskes and Delva Daines (1989), presented the three areas of agreement in research from the mid-70s and early 80s:

1. Per consensus, age is a determining factor in a student's ability to recognize and use metacognitive strategies.
2. Studies revealed that good readers are more aware of using metacognitive strategies to comprehend text than are poor readers.
3. Good readers use metacognitive skills more often than do poor readers.

WHAT IS STRP?

The Strategic Teaching and Reading Project (STRP) is a research-based instructional improvement and staff development project that measurably improves student reading comprehension. It was originally developed in 1987 as a collaborative effort of the North Central Regional Education Laboratory (NCREL), the Wisconsin Department of Public Instruction (WCPI), and the Wisconsin Department of Public Instruction (WECB). NCREL's participation came in response to its mission of providing practitioners with research and useful educational practices while building capacity within the schools. STRP works with any existing curriculum and instructional materials, adapts to local and state learning objectives, is suitable for all classrooms (K-12), and maintains the creativity and instructional freedom of teachers. Intended for schools seeking a professional development plan that uses reading as a framework, STRP presents five global reading strategies which are Metacognition, Prior Knowledge, Inference, Word Meaning, and Text Structure. STRP defines metacognition as "thinking about your own thinking to regulate and to overcome setbacks in understanding and comprehension by monitoring the use of all strategies throughout the reading process. This definition leads this research study.

PURPOSE

The purpose of this study was to examine the metacognitive strategies used in reading by students ranging from grade second through twelve. More specifically, the present study provides specific metacognitive behaviors used by these students after their teachers received training and began implementing specific approaches to enhance reading comprehension.

METHOD

Participants

Ten K-12 public schools and 1570 students participated in this study. The schools were located in the states of Maryland (2), Ohio (2), Hawaii (1), Illinois (3), New York (1), and North Carolina (1). They were six K-6, two middle and two high schools. Students on grades 2nd to 12th, who were monolingual and bilingual, from urban and suburban schools, and different ethnic backgrounds were the subjects of analysis of this research conducted under the auspices of North Central Regional Educational Laboratory (NCREL) through the Strategic Teaching and Reading Project (STRP).

Table 1 summarizes the number of subjects who participated in the data collection by grade level and by the type of interview instrument taken.

Table 1
Subjects by Grade Level and Interview Form Taken

Grade Level	Number of Subjects	Interview Form
2nd - 3rd	567	5 Items
5th	160	6 Items
6th	355	4 Items
7th - 12th	488	7 Items

All schools and teachers in the purposeful sample participated in a two-year STRP plan contracted by each school with NCREL. The STRP service contract consisted of at least two years of pedagogical and instructional support provided by consultants, reading and curriculum specialists who trained teachers twice a year, conducted classroom observations, created supportive STRP school environments operating on the infrastructure that examined the efficacy and effectiveness of six strategic priorities: (1) why we teach, (2) who we teach, (3) what we teach, (4) ways we teach, (5) who teaches, and (6) where we teach.

PROCEDURES

The participating teachers were exposed to and trained on five global reading strategies of STRP for three consecutive days. The training structure involved training activities for Metacognition and prior Knowledge (day 1), the second day Inferencing and Word Meaning training activities, and the last day Text Structure with the development of a lesson plan incorporating and integrating all five strategies in a selected content. During the training, all teachers received a Training Manual and the STRP Guidebook. Teachers received hands-on experiences and open possibilities for immediate classroom applications. For the purpose of this study, the training on Metacognition included the use of the Metacognitive Interview Form (Younger and Older Students). Teachers received instructions on how to utilize it in their classrooms and the purpose of it. In the directions given, the individual classroom teachers had to select a short reading passage. Then, they administered the interview form after students had read the selection. In the process, the teacher gave direction of the reading selection and interview form. The students were asked to read the short reading selection silently. This gave them the opportunity to evoke

cognitive and metacognitive strategies. At the conclusion of the reading, the students were asked to respond to the questions on the Metacognitive Interview Form independently. Students were not given a time limit. A different procedure was utilized for students identified as low ability readers or no readers. The teachers read the reading passage and students had to be individually interviewed.

THE INTERVIEW FORM

The Metacognitive Interview Form for Younger and Older Students (NCREL, 1995 rev. ed.) were the instruments administered to determine the degree of the use of metacognitive strategies by primary, middle, and high school students. The instruments differed in the number of items according to adaptations created and permitted to the participating schools. Basically, the interview form for younger students (2nd and 3rd grades) consists of five semi-structured questions that elicit the use of metacognitive strategies. The questions are as follows:

Q1. *What should I do first? Should I do anything before I start to read? Show me how to do that.*
Q2. *What should I do while I am reading? Show me how to do that.*
Q3. *What should I do if I am having trouble understanding while I am reading?*
Q4. *What should I do when I finish reading?*
Q5. *Do I need to do anything else to really understand what I read?*

The interview form for 5th grade students contains the following six questions:

Q1. *What should you do before you start to read? Why is this important?*
Q2. *What should you do or think about while you're reading?*
Q3. *What should you do if you get stuck on a word?*
Q4. *What should you do or think if you have trouble understanding what you are reading?*
Q5. *What should you do or think about when you finish reading?*
Q6. *What else could help you to really understand the story?*

The interview form for 6th grade students includes the following four items:

Q1. *What should I do first? Should I do anything before I start to read? Show me how to do that.*
Q2. *What should I do while I am reading? Show me how to do that.*
Q3. *What should I do if I am having trouble understanding while I am reading?*
Q4. *Do I need to do anything else to really understand what I read?*

The interview form for 7th to 12th grade students presents the following six items:

Q1. *What is reading in your view? How do you define reading?*
Q2. *What is good reading?*
Q3. *Do you use strategies?*
Q4. *What strategies do you use?*
Q5. *Which strategies are your best?*
Q6. *Which strategies do you find the most difficult?*

DATA ANALYSIS

There were two stages in the data analysis process. The first stage consisted of tallying all the students' responses from the Metacognitive Interview Form. Rewriting and transcribing the students' responses verbatim was the initial step. First, under each question, all responses given to that question were written. The second stage consisted of analyzing the students' responses based on a list of metacognitive behaviors and indicated in the literature review. Then, the interview was coded and analyzed using a triangulation design. This design allowed for the discovery of patterns that characterize the students' metacognitive use of reading strategies.

FRAMEWORK OF METACOGNITIVE BEHAVIORS

The researchers created a framework of metacognitive behaviors based on the literature review. Listed below are 35 metacognitive behaviors, skills, and strategies an individual could utilize in order to demonstrate how self-regulated and how in-control the individual is of the process of comprehension. For the purpose of this study, if the responses were found to match one of the behaviors, skills or strategies, it was counted as using metacognition. If not, the response was considered not metacognitive, and therefore, it was ignored.

B1 Evaluate the cognitive experience
B2 Setting the purpose for reading
B3 Understand task
B4 Select the best strategy for specific texts.
B5 Focus the attention to a specific problem.
B6 Decide when to stop the activity if a difficulty arises.
B7 Determine if he is comprehending what is reading or listening
B8 Transfer the strategies and principles learn from one task to another
B9 Determine if the goals and abilities are consistent and congruent
B10 Recognize the demands of a specific task
B11 Distinguish the means to accomplish the demands of the goals
B12 Be able to identify strengths and how to compensate the deficiencies
B13 Time for independent reading
B14 Select own reading materials
B15 Modeling and discussing his/her own reading processes
B16 Using strategies that activate prior knowledge
B17 Making and testing predictions
B18 Permitting time for restructuring the task
B19 Using contextual analysis for unfamiliar terms
B20 Identifying organization and structure of the text
B21 Setting aside time for reflection on what was read
B22 Asking for a summary of major ideas in the selection
B23 Providing after reading applications
B24 Monitoring comprehension
B25 Anticipating
B26 Predicting
B27 Using fix-up strategies
B28 Using contextual analysis
B29 Planning
B30 Summarizing
B31 Testing
B32 Revising
B33 Evaluating
B34 Checking
B35 Rereading

RESULTS

As demonstrated below, percentages of metacognitive responses were tabled and graphed according to each question answered. Also, the observed metacognitive behaviors were charted and described.

TABLE 2
Questions and Percentage of Responses by 2nd and 3rd Grade Students

Questions	Q1	Q2	Q3	Q4	Q5
Percentages	39	70	99	55	68

The overall percentage of metacognitive responses for the five questions for 2nd and 3rd grade was 66%. Of the 35 metacognitive frameworks, 11 such behaviors were observed. The following table shows the frequency of responses given based on the metacognitive framework. It can be observed that B35 (reread), B12 (strengths and deficiencies), and B15 (modeling) received the highest number of responses.

Table 3
Observed Metacognitive Behaviors for Grades 2 and 3

Metacognitive Behaviors	Description	Frequency
B 12	Be able to identify strengths and how to compensate deficiencies	201
B15	Modeling and discussing his/her own reading process	149
B21	Setting aside time for reflection on what was read	22
B24	Monitoring Comprehension	37
B25	Anticipating	98
B26	Predict	368
B28	Using Contextual Analysis	197
B30	Summarize	19
B31	Testing	6
B34	Checking	97
B35	Reread	229

Table 4 shows the percentage of responses by 5th grade students. The overall percentage of metacognitive responses for the six questions for 5th grade was 97%. Of the 35 metacognitive frameworks, 20 such behaviors were observed.

Table 4
Questions and Percentage of Responses by 5th Grade Students

Questions	Q1	Q2	Q3	Q4	Q5	Q6
Percentages	100	100	100	100	80	100

The following table summarizes the observed metacognitive behaviors most and least frequently exhibited by 5th grade students.

Table 5
Observed Metacognitive Behaviors for Grade 5

Metacognitive Behaviors	Description	Frequency
B5	Focus the attention to a specific problem	45
B11	Distinguish the means to accomplish the demands of the goals	79
B 12	Be able to identify strengths and how to compensate deficiencies	39
B15	Modeling and discussing his/her own reading process	60
B16	Using strategies to activate prior knowledge	13
B21	Setting aside time for reflection on what was read	19
B26	Predict	141
B28	Using Contextual Analysis	115
B30	Summarize	118
B31	Testing	16
B34	Checking	25
B35	Reread	81

As it can be observed in Table 5 the metacognitive behaviors of predicting (141), summarizing (118), and using contextual analysis (115) were reported as the most frequently used by 5th grade students. The following table summarizes the percentage of responses for questions 1 to 4 given by 6th grade students to the Metacognitive Interview Form.

Table 6
Questions and Percentage of Responses by 6th Grade Students

Questions	Q1	Q2	Q3	Q4
Percentages	68	72	95	91

The overall percentage of metacognitive responses of the four questions for 6th grade was 82%. Of the 35 metacognitive frameworks, 20 such behaviors were observed.

Table 7
Observed Metacognitive Behaviors for Grade 6

Metacognitive Behaviors	Description	Frequency
B 12	Be able to identify strengths and how to compensate deficiencies	67
B15	Modeling and discussing his/her own reading process	36
B16	Using strategies to activate prior knowledge	60
B21	Setting aside time for reflection on what was read	2
B24	Monitor comprehension	25
B26	Predict	136
B28	Using Contextual Analysis	77
B30	Summarize	15
B31	Testing	8
B34	Checking	73
B35	Reread	118

Sixth grade students seem to utilize more frequently the metacognitive behaviors of predicting (136), rereading (118), and using contextual analysis (77).

Table 8
Questions and Percentage of Responses by 7th thru 12th Grade Students

Questions	Q1	Q2	Q3	Q4	Q5	Q6
Percentages	61	52	0	71	53	48

The overall percentage of metacognitive responses for the six questions for grades 7 through 12 was 41%. Of the 35 metacognitive frameworks, 20 such behaviors were observed.

Table 9
Observed Metacognitive Behaviors for Grades 7 through 12

Metacognitive Behaviors	Description	Frequency
B2	Setting the purpose for reading	166
B3	Understanding the task	46
B5	Focus the attention to a specific problem	6
B6	Decide when to stop the activity if a difficulty arises	2
B12	Be able to identify strengths and how to compensate deficiencies	46
B13	Time for independent reading	3
B14	Select own reading materials	23
B15	Modeling and discussing his/her own reading process	71
B16	Using strategies to activate prior knowledge	20
B21	Setting aside time for reflection on what was read	10
B24	Monitoring comprehension	160
B26	Predict	76
B28	Using Contextual Analysis	229
B30	Summarize	83
B34	Checking	49
B35	Reread	104

The upper level students, middle and high school, a total of 488, reported specific metacognitive behaviors in accordance with the expectations of the researchers. A group of 229 revealed using contextual analysis as the first instance of metacognition, followed by setting the purpose for reading (166), monitoring comprehension (160), and rereading (104).

Table 10
Overall Metacognitive behaviors of 2nd to 12th Grade Students

Metacognitive Behaviors	Description	Frequency
B2	Setting the purpose for reading	166
B3	Understanding the task	46
B5	Focus the attention to a specific problem	51
B6	Decide when to stop the activity if a difficulty arises	2
B11	Distinguish the means to accomplish the demands of the goals	79
B12	Be able to identify strengths and how to compensate	353

	deficiencies	
B13	Time for independent reading	3
B14	Select own reading materials	23
B15	Modeling and discussing his/her own reading process	316
B16	Using strategies to activate prior knowledge	93
B21	Setting aside time for reflection on what was read	53
B24	Monitoring comprehension	222
B25	Anticipating	98
B26	Predict	721
B28	Using Contextual Analysis	618
B30	Summarize	235
B31	Testing	30
B34	Checking	244
B35	Reread	532

The table summarizes the metacognitive behaviors expressed by 1570 2nd to 12th grade students. It is important to note that there was no data collected on 4th grade students. The metacognitive behaviors *most frequently* manifested were: predicting (721), using contextual analysis (618), rereading (532), and modeling and discussing his/her own reading process (316). The opposite, the *least frequently* metacognitive behaviors reported were: deciding when to stop the activity if a difficulty arises (2), time for independent reading (3), and summarizing (30).

CONCLUSION

It seems to be an agreement among reading researchers and cognitive psychologists that metacognition refers to possessing knowledge of what effect one's learning task and of how one controls learning such task. According to Bonds, Bonds, & Peach (1992) during reading there are three factors to be considered: knowledge of oneself as a reader, the demands of the reading or learning task, and the strategies employed in the learning task or activity. The findings of this study sought to understand what strategies employed the student during the reading task. A list of 35 metacognitive behaviors based on multiple research studies, was the frame of reference for identifying the most and least frequently used metacognitive behaviors of a sample of 1,500 2nd to 12th grade students, excluding 4th graders. In this regard, the metacognitive behavior of prediction, a mental picture on what would happen in the story, emerged as the most frequently used metacognitive behavior. On the opposite side, students seemed not to have control over deciding when to stop the activity if a difficult arose. When we examined metacognition as consisting of three basic elements of (1) developing a plan of action, (2) maintaining/monitoring the plan, and (3) evaluating the plan, the findings pointed toward students deficiencies on how to maintain and monitor the process, the plan of action. In fact, this particular evidence has implications for teachers. Teachers would reinforce metacognitive strategies through proper instruction on how to maintain and monitor the process. An example of this is selectively incorporating self-reflective questions such as: How am I doing? Am I on the right track? How should I proceed? What information is important to remember? Should I move in different direction? Should I adjust the pace depending on the difficulty? What do I need to do if I do not understand? . While it has been suggested by the present study that students are using 19 of 35 metacognitive behaviors, readers should be continuously instructed on metacognition. The fact that metacognitive strategies proved to be more effective suggests that these strategies should be integrated into instruction for students at various ability levels, age, and grade levels. In planning a lesson, because metacognitive strategies facilitate reading comprehension, a teacher should include them not only across content areas and skills areas, but across the process of teaching: *before, during, and after lesson.*

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